



NATIONAL COMPETENCY SKILL STANDARDS FOR PERFORMING AN ELECTROENCEPHALOGRAM

Electroencephalographic (EEG) providers practice in accordance with the facility policy and procedure manual which details every aspect and type of recording.

The American Society of Electroneurodiagnostic Technologists, Inc. presents this document to provide the national criteria for evaluating competencies for technologists performing an electroencephalogram (EEG). These competencies were established following a survey of the membership in the Fall of 1996. The Professional Testing Corporation (PTC) in New York City completed the survey process and provided the analysis. The ASET Board of Trustees approved this document August 11, 1997. This document was updated in the Spring of 2010 according to nationally recognized and accepted criteria and approved by ASET's Board of Trustees in March 2011.

The elements for quality patient care and interaction as well as basic knowledge and technical performance were considered. The technical components include those defined in the American Clinical Neurophysiology Society (ACNS) 2006 Revisions to the EEG Guidelines published in the *Journal of Clinical Neurophysiology*, Volume 23, Number 2, April 2006.

Section I: EEG Core Knowledge

The electroencephalographic (EEG) technologist has the knowledge base to interact with the patient and obtain a quality, interpretable EEG recording that will yield information about the brain's neuronal activity. The technologist possesses the appropriate knowledge level of diseases to correlate patient history and clinical symptoms to determine appropriate maneuvers to be performed during the EEG. Technical Skills and Other Abilities:

The EEG technologist provides a safe recording environment by:

- verifying identity of the patient
- disinfecting electrodes after each procedure or using disposable products
- following standard precautions for infection control per facility policy and procedures
- attending to patient needs as established by facility policy and procedures
- recognizing/responding to life-threatening situations
- being certified to perform cardiopulmonary resuscitation
- following facility policy and procedures for sedation
- complying with facility policy and procedures for emergency and disaster situations
- complying with hazardous material handling procedures
- maintaining instrument/equipment in good working order
- taking appropriate precautions to ensure electrical safety.

The EEG technologist establishes rapport with the patient and the patient's family by:

- using personal communication skills to achieve patient relaxation/cooperation
- explaining all test procedures including activation procedures
- explaining the electrode application method (paste, collodion, etc.)
- interacting on a level appropriate to patient's age and cognitive ability
- maintaining respect and patient confidentiality.

The EEG technologist evaluates the patient to:

- determine the patient's mental age, mental state, and comprehension level
- note the patient's overall physical condition
- determine appropriate method of electrode application
- ascertain the patient's capacity to cooperate with activation procedures
- determine if hyperventilation/photic stimulation is contraindicated
- accommodate for disabilities or special needs
- determine the need for additional physiological monitors
- document unusual or inappropriate behavior suggestive of seizure or psychogenic nonepileptic event
- determine the possible need for restraints or emergency intervention.

The EEG technologist prepares a basic data sheet that includes:

- patient's information (name, age, ID number, doctor, etc.)
- recording time, date, and technologist's name or initials
- pertinent patient history and familial medical history
- previous EEG reports
- current medication/sedation and time of last dosage
- time of last meal
- time, date, aura, and circumstances of last seizure or symptoms
- patient's mental, behavioral, and consciousness states
- diagram of skull defects or anomalies (if any)
- diagram of any modifications in electrode placement.

The EEG technologist's electrode application follows a method that includes:

- ensuring accurate electrode placement according to the International 10–20 System or modified 10–10 System
- adjusting electrode placement for anatomical defects or anomalies
- cleaning the electrode site to reduce skin impedance prior to scalp electrode application
- applying surface electrodes with EEG conductive paste or with collodion and electrolyte
- verifying surface electrode impedances measure below 5,000 Ohms
- verifying when sterile, disposable subdermal needle electrodes are used, impedances measure below 10,000 Ohms
- applying electrodes to record ECG.

Section II: Instrumentation

The EEG technologist documents the working condition of a digital EEG instrument by:

- calibrating system amplifiers
- verifying standard filter settings

- verifying sensitivity settings
- inputting a biological (bio-cal) signal to all channels
- observing the first 30 seconds of the recording from the primary system-reference montage when instrumental and biological calibration cannot be performed
- correcting or reporting deviations per facility policy and procedure.

The EEG technologist applies the principles of electronics and mathematics to recording by:

- knowing how differential amplifiers work
- computing voltage and frequency of waveforms
- calculating the duration of waveforms
- understanding the polarity of waveforms
- understanding impedance
- understanding analog to digital conversion.

The EEG technologist knows how digital waveforms are affected by:

- 60 hertz filter
- filter settings
- digital filters
- sensitivity settings
- referential and bipolar montages
- electrodes type and electrode material composition
- malfunctioning equipment
- printer conversion of data.

Section III: Recording Principles

The EEG technologist obtains a standard EEG that includes:

- a minimum of 20 minutes of technically acceptable recording
- eye opening and closing to check effects of stimuli on EEG
- hyperventilation for a minimum of 3 minutes
- photic stimulation at frequencies appropriate for history and reactivity
- minimum recording of one minute post hyperventilation/photic stimulation
- mental stimulation/assessment procedures
- periodic checks of electrode impedance
- natural drowsiness and sleep, if possible
- notations of montage, filters, display speed, and sensitivity setting changes
- notes of observed behavior, clinical seizure manifestations, etc.
- minimum recording of 2 minutes post any questionable event.

The EEG technologist customizes the recording procedure by:

- evaluating reason for referral, history, and observed waveforms
- utilizing techniques to bring out or enhance clinical symptoms
- selecting montages appropriate for abnormalities seen and/or expected
- selecting appropriate instrument settings, i.e., filters, sensitivity, timebase
- encouraging drowsiness and sleep
- applying additional electrodes and adjusting montage, if needed, to localize abnormal activity
- recording respiration, if appropriate
- recording ECG rhythms.

The EEG technologist differentiates artifacts from cerebral waveforms by:

- recognizing possible artifactual waveforms
- documenting (on the recording) patient movements
- applying electrodes to record eye movements
- replacing electrodes exhibiting questionable activity or contact
- troubleshooting for possible electrical interference.

The EEG technologist:

- reports critical tests results* to the interpreting physician and supervisor and documents this communication according to facility policy and procedures
- documents sedation used, dosage, and effects (if applicable)
- reviews EEG for appropriate documentation or amplifier settings and montage changes
- removes electrode paste/collodion/adhesive from the patient's scalp and hair.

Section IV: Knowledge Base Statements

The EEG technologist understands (has a working knowledge of):

- medication effects on the EEG background and waveforms
- medical terminology and accepted abbreviations
- signs, symptoms, and EEG correlates for adult neurological disorders
- signs, symptoms, and EEG correlates for pediatric neurological disorders
- seizure manifestations, classifications, and EEG correlates
- psychiatric and psychological disorders and EEG correlates.

The EEG technologist understands and follows technical criteria for

- recording electrocerebral inactivity (brain death)
- recording neonatal EEG
- recording pediatric EEG.

The EEG technologist recognizes:

- normal and normal variants awake and asleep patterns for each age range
- abnormal awake and asleep patterns for each age range
- EEG patterns for levels of consciousness
- clinical and nonconvulsive seizure patterns.

The EEG technologist possesses the knowledge base necessary to correlate patient history and clinical symptoms in order to determine the appropriate electrode application and recording parameters in the following disease processes:

- seizure classification
- stroke
- trauma
- encephalopathy
- altered consciousness.

The EEG technologist maintains and improves knowledge and skills by:

- reviewing EEG records with the electroencephalographer on a regular basis
- reading journal articles
- studying textbooks related to the field
- attending continuing education courses in clinical neurophysiology
- completing online EEG courses
- participating in quality assurance/improvement reviews
- participating in professional organizations for neurodiagnostics
- achieving EEG certification and meeting recertification requirements.

* Critical test results – any values/interpretations where delays in reporting may result in serious adverse outcomes for patients. MA Coalition for Prevention of Medical Errors; www.macoalition.org/document/CTRPractices.pdf

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